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Report on preservative treatment
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REPORT ON PRESERVATIVE TREATMENT OF RAILROAD TIES

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FEDERAL COORDINATOR OF TRANSPORTATION

WASHINGTON

FEDERAL COORDINATOR OF TRANSPORTATION
WASHINGTON

JOSEPH B. EASTMAN
COORDINATOR

11/9/35 RE
Nov 21, 1935 Hrc

March 27, 1936

TO THE EXECUTIVES OF CLASS I RAILROADS:

I send you herewith a report prepared by my Section of Property and Equipment on Preservative Treatment of Railroad Ties. The information contained therein is based on replies received to the Inquiry which I sent to you under date of September 7, 1935.

In view of the fact that the quantity of railroad material treated during the period covered by the report was below normal, even if measured by present requirements for proper maintenance of way, I shall not request you at this time to take specific action based on the data given in the report, but merely call to your attention the conclusions stated therein.

I do recommend, however, that in view of the importance of the subject, it be studied carefully by the individual railroads in the light of information presented in this report. I also recommend that it be taken up actively by the proper departments of the Association of American Railroads, to the end that maximum economy in all wood preservation may be attained by the railroads as a whole, through collective as well as individual action. The services of my Section of Property and Equipment will be available to assist in such studies.

Very truly yours,

Joseph B. Eastman

FEDERAL COORDINATOR OF TRANSPORTATION

SECTION OF PROPERTY & EQUIPMENT

WASHINGTON

R. L. LOCKWOOD

DIRECTOR

March 24, 1936

Memorandum to the Coordinator:

The report of this Section on Preservative Treatment of Railroad Ties is submitted herewith. It is based on replies to the Inquiry sent to all Class I railroads on September 7, 1935. That Inquiry requested information in regard to all classes of railroad material treated in wood preserving plants, but since ties constitute the bulk of railroad material so treated, this report is confined to treatment of ties, including cross ties, bridge ties, and switch ties. It was prepared under the direction of Mr. C. W. Brown of this Section.

The Inquiry called for information covering the year 1934, during which the railroads bought approximately 53,000,000 ties, as compared with an average of 79,000,000 ties per year for the five years ending December 31, 1929. Total operations of all plants engaged in tie treating were therefore far below normal, and costs were correspondingly high. While the report shows little difference in costs to the railroads between treating ties in their own plants and having them treated in commercial plants during 1934, our studies indicate that under normal conditions the railroads could treat ties in their own plants at a cost lower than the prices charged by commercial plants. It also seems probable that consolidated operation of railroad plants would result in further reduction of unit costs.

R. L. Lockwood

R. L. Lockwood,
Director.

On September 7, 1935, the Coordinator sent to 149 Class I Railroads an Inquiry in regard to the cost of applying preservative treatment to wood products used by railroads. This report is based on the information received from the railroads in response to that Inquiry.

Replies to the various sections of the Inquiry were distributed as follows:

Section 1. 18 roads furnished information regarding a total of 32 railroad-owned plants.

Of these 32 plants, 20 were operated by the owning carrier during the entire year 1934, 2 were operated by the owning carrier during the first part of the year and then turned over to others to operate, 5 were operated by others under contract during the entire year, and 5 were closed during the entire year.

Section 2. 13 roads furnished information regarding the cost of operating the 22 plants which they operated during all or part of the year 1934.

Section 3. No replies received. (This Section called for information regarding operation by roads of treating plants not owned by them.)

Section 4. One railroad-owned plant was leased as of December 15, 1934, but no material for railroad was treated during balance of year.

Section 5. Five roads furnished information regarding the six plants which they owned, but which were operated by others during all or part of the year 1934.

Section 6. 56 roads furnished information regarding railroad-owned material which was treated at commercial plants during the year 1934.

Section 7. 73 roads furnished information regarding treated material purchased during the year 1934.

While the replies received indicated that an earnest effort had been made to furnish the information requested in the Inquiry, they also developed the fact that many roads had not kept their records in a way which would enable them to furnish comparable figures without incurring disproportionate expense, which did not seem warranted under present conditions.

Ties constitute the bulk of railroad material which receives preservative treatment. They are fairly uniform in size, and there is less diversity in the kind and quantity of preservative used for them than for piles, poles, structural timber, and miscellaneous lumber. It was therefore deemed advisable to confine our present study to ties. For the sake of uniformity, there are included under that heading not only cross-ties, but also bridge ties and switch ties.

The major variables involved are size and kind of ties, and kind and quantity of preservative used, and a preliminary study of the returns indicated that there were no two roads having exactly comparable conditions. However, the various factors involved seem to have approximately the same range of diversity in respect to ties treated at railroad-owned plants as in respect to those treated at commercial plants or purchased already treated. Since the railroads procure a substantial quantity of ties from each of the different sources, average figures will give a fairly good indication of the relative cost under each method of procurement. Furthermore, both railroad-owned and commercial plants are widely distributed geographically, hence average labor costs are reasonably comparable.

In some cases, both in respect to railroad-operated plants and to commercial plants, it was not practicable to secure cost figures in sufficient detail to enable elimination of all special items of expense, such as cost of anti-checking devices and cost of applying them, and cost of prefabrication. In such cases, or where there was any question as to the accuracy or comparability of the figures submitted, they were omitted from the compilation of average costs. There remained, however, a sufficient number of plants and a sufficient volume of production represented under each classification, to give average cost figures which should be truly representative.

For the railroad-operated plants it was possible in most cases to segregate the cost of yard handling, and since the ties unloaded and piled for seasoning, or taken from storage and shipped, were not in all cases the ties which were treated during that year, the cost of yard handling was calculated separately for the ties actually handled, and is shown separately in the tabulation on page 5. It was found, however, that the total number of cubic feet yarded at all railroad operated plants during the year was approximately the same as the total number of cubic feet treated during the same period.

It appears that few roads actually charge interest on investment, or depreciation of buildings and equipment, against the operation of their wood treating plants. Several roads compute such charges for statistical purposes, and others estimated or figured them especially for our use, but in order to secure uniformity it was necessary for us to adjust these two items in most of the railroad plant returns. This was done on a basis of 6% interest and 3% (average) depreciation per annum, which is probably more than was charged (or earned) by the commercial plants during 1934.

It was found that in most of the railroad-operated plants inspection was performed by salaried employees and not charged separately, so in all other cases where cost of inspection was given or could be determined, it was added to the cost of treatment.

With regard to prefabrication, it was found that practically all of the standard cross ties treated at railroad-owned plants were adzed and bored before treatment, and some were grooved or incised. A much smaller proportion of those treated at commercial plants were so prepared, and only a small minority of those purchased already treated. In arriving at the average cost of prefabrication per cubic foot we have therefore taken into consideration only those ties which were actually prefabricated before treatment.

SUMMARY OF DATA COVERING THE YEAR 1934

	R.R.owned plants operated by Railroads	R.R.owned plants operated by Contractors	R.R.material treated at commercial plants	Treated material purchased from commercial plants
Total production on which cost was based, in cubic feet.	24,677,279	6,217,355	31,444,459	7,489,108
Number of plants from which this material was procured.	21	5	70	58
Number of States in which these plants were located	15	5	29	20
Average cost of Preservative Treatment only, including cost of loading on trams and unloading from trams to cars or storage, also cost of chemicals and cost of inspection, but not including cost of untreated ties. F.O.B. plant or line of roads.* Per Cubic Foot.	$0.1300	$0.1523	$0.1278	
Average cost of yard handling, including unloading from cars and piling for seasoning and, in some cases, storing after treatment, and loading for shipment. Per Cubic Foot.	0.0088	$0.0123	0.0111	$0.1601
Average cost of prefabrication, including adzing, boring, and in some cases, grooving and incising. (For that portion of total which was prefabricated). Per Cubic Foot.	0.0052	0.0059	0.0076	$0.0185
Total cost of Treatment, including yard handling and prefabrication, but not including untreated ties or anti-checking devices. F.O.B. plant or line of road.* Per Cubic Foot.	$0.1440	$0.1705	$0.1465	$0.1786

* F.O.B. plant in the case of R.R. operated plants, otherwise F.O.B. line of road.

Note.-As previously explained, total costs per cubic foot as given above are not the averages of actual costs reported, but are the estimated average costs if railroad-operated plants had charged 6% interest and 3% depreciation, and if all ties had been adzed and bored before treatment.

Reference has been made to certain variable cost items, and to the probability that if a sufficient number of individual costs were included an average figure would fairly represent the group. To make sure that this assumption was sound, a number of checks were made, of which the following is typical:

The foregoing tabulation shows that the average cost of preservative treatment only, at the 21 railroad-operated plants, was $0.1300 per cubic foot. Of this cost $0.0700 was the average cost of the preservatives f.o.b. plant. However, there was considerable variation in the cost of preservatives per cubic foot at the various plants, due in part to the kind of chemicals used, and in part to location of the plant. The total cost for each plant was therefore refigured on the basis of a uniform cost of chemicals of $0.0700 per cubic foot. This changed the unit costs at individual plants considerably, but the weighted average was still remarkably close to the original figure, being $.1304 instead of $.1300.

The treating cost, as developed above, was considerably higher than had been anticipated, but this was clearly due to the small quantity of material which was treated in 1934.

In checking the rate of operation of railroad-owned plants, difficulties were encountered because of the fact that no two roads appeared to use the same methods for calculating the annual capacity of their plants. Detailed study of a number of specific performance records indicated that a fair figure for the annual capacity of a tie-treating plant was 500 cubic feet of ties per cubic foot of retort capacity, on the basis of operating the plant 24 hours per day, (3 - 8 hour shifts) and 300 days per year.

On that basis it was found that of the 21 railroad-operated plants which treated ties in 1934, the tie output of two plants amounted to less than 5% of capacity, one plant exceeded its rated capacity, and the average for all plants was 22.7 percent of capacity.

While the commercial business was divided among a greater total number of plants than were operated by the railroads, the bulk of this business went to a comparatively few companies and plants, and these companies apparently fared somewhat better than the railroads, although even so it is doubtful whether they earned 6% on their invested capital after charging proper depreciation. Of the 21 railroad-operated plants, only 12 treated ties to the amount of

1,000,000 cubic feet or more during the year 1934, whereas there were at least 19 commercial plants which had an output of 1,000,000 cubic feet or more.

The cost of preservative treatment per cubic foot is bound to decrease materially as the volume of business increases, since the fixed charges per unit of output vary inversely with the volume, and the direct charges, (labor, power, etc.) per unit should decrease to some extent as volume increases. It is therefore important, for the sake of economy, that the volume of work handled by railroad-operated plants should bear a much larger ratio to their capacities.

The advantage of quantity production is clearly illustrated by a study of the cost figures for the 21 railroad-operated plants which are under consideration. Of these 21 plants, 10 were operated in 1934 at 25% or more of capacity, the average rate being 33.9%, and for these 10 the average cost of treatment was only $0.1166 per cubic foot as against $0.1300 for the entire group. The other 11 plants, operating at an average of only 13.6% of capacity, showed an average cost of $0.1583 per cubic foot.

As general business improves and the railroads are able to take up deferred maintenance, their tie requirements will undoubtedly increase, but there are a number of roads which evidently built treating plants to take care of their requirements during the transition period when tie treatment was coming into general use, and now that a large percentage of ties in track are already treated, it is doubtful if their individual requirements will ever again require the use of their entire plant capacity. It appears, therefore, that either this excess capacity should be permanently disposed of, or some way should be found for securing more business for railroad-operated plants.

A careful study was made of the location of railroad-owned treating plants, and of commercial plants which treated railroad material or sold treated material to the railroads during the year 1934. This study indicated that if due consideration had been given to the sources of supply of untreated ties and the points at which treated ties are used, it might have been possible to transfer enough of the 1934 business from commercial plants to railroad plants to have approximately doubled the output of the latter, without adding materially to the cost of transporting ties to their final destination. If this could have been done, it seems probable that the cost of treatment at these plants would not have exceeded $0.1150 per cubic foot, as compared with an actual

cost of $0.1300 at railroad-operated plants and a somewhat higher figure at commercial plants. This would have resulted in saving at least $0.015 per cubic foot, or at least 5 cents per tie. On the basis of normal replacement of approximately 70,000,000 ties per year, such saving would amount to a total of not less than $3,500,000 per year.

Such a policy on the part of the railroads would probably seriously impair the business of some of the commercial wood preserving plants. There is ample evidence, however, that there is at present an excess of wood preserving capacity in the country, and considerations of ultimate economy point toward the elimination of some of the smaller and less efficient plants. From the standpoint of economy to the railroads alone, the information on which this report is based indicates that the railroads as a whole could make substantial savings in the cost of wood preservation by concentrating such operations in a relatively small number of plants owned and operated by themselves, individually or jointly.

In addition to costs of wood preservation, careful consideration must also be given to the efficiency of preservative treatment. This can be determined only through records of actual performance, covering a considerable length of time. Such records as are available at present indicate that material treated in railroad-operated plants is at least as efficient in service as that treated in commercial plants or bought already treated. In some cases, records of service indicate that material from railroad plants is distinctly superior. This is not surprising, in view of the immediate and vital concern of the railroads in getting maximum economy, measured by service life, rather than in making a commercial profit from these operations.

The following conclusions are drawn from the information received in reply to the Inquiry, and from other authoritative sources:

1. The railroads which are now operating wood preserving plants should continue to do so.

2. These railroads, also railroads which now own such plants but have them operated by outside contractors, and railroads which own such plants but have closed them, should cooperate in a determined effort to secure a sufficient volume of business from other roads to enable reasonably efficient operation of as many railroad-owned plants as possible.

3. In case it is found impossible to secure a sufficient volume of business to operate a given plant at such

proportion of its capacity as would result in reasonable unit costs, such plant should be disposed of permanently on the most favorable basis obtainable.

4. A study should be made under the auspices of the Association of American Railroads to determine the possible advantages of consolidation of wood preserving plants, on a regional if not a national scale. On present information, it appears possible that some degree of consolidation and joint operation might further reduce the total cost of treated materials delivered at the point of use. A principal factor in such reduction would be the allocation of sufficient business to each well-equipped plant to enable it to operate at a high proportion of its capacity.

5. Further technical study of wood preservation should be carried on under the auspices of the Association of American Railroads, and of the American Railway Engineering Association in particular. Such study should be directed particularly toward developing and promoting the use of standard specifications covering kind and quantity of materials to be used for preserving the different kinds of wood products, and toward developing and promoting the use of efficient standard methods of inspecting and testing such products.

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